Smart Dentist on Your Wrist

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According to the World Health Organization (WHO), nearly 90% of adults and 60% of children have dental health problems (e.g., gingivitis, plaque and calculus). For young people, the sooner they develop good oral hygiene habits (such as tooth brushing), the sooner they can benefit from it. Researches try to help people maintain a better oral health through Internet of Things (IoTs) and artificial intelligence (AI). This paper presents an easily accessible monitoring system for evaluating the tooth brushing with common smart watch. The system captures the users' brushing behaviors through two common build-in sensors in a smart watch (e.g., the motion of the hands with IMU, and the acoustic signals during tooth brushing with microphone). And then, the collected data is transmitted to the smartphones via Bluetooth. Considering the mismatching frequencies and the randomness of the raw sensor data, 78 different time and frequency domain statistical features are used instead of the raw signals. Finally, we compared 9 different machine learning models based on 78 statistical features and related brushing events. Finally, the 3-layer DNN model is adopted to significantly improve the accuracy of detecting tooth brushing tasks by up to 97.7%, and will be integrated into the mobile APP for real-time evaluation.

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